



# Marshall Space Flight Center Mission Operations Laboratory

Engineering Solutions for Space Science and Exploration



Data Management  
Controller console



Payload Operations Integration Center



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## The Mission Operations Laboratory (MOL)

designs and implements cost effective mission operations systems and support options for NASA, the Department of Defense, commercial, and academic organizations. Our primary goal is to enable user control and access to their space based assets via simple, safe, and cost effective processes and capabilities. Whether it is an International Space Station (ISS) payload, a launch vehicle, an earth orbiting satellite, or a deep space observatory or probe, MOL promotes mission success by helping users to enhance the operability of their flight systems design, plan mission operations, train astronauts and ground personnel, implement ground-based data systems, and conduct flight operations. Other key capabilities include Ground based and On-Orbit logistics planning and Ground Support Equipment Systems Engineering.

MOL's vibrant history began in 1960 with the Huntsville Operations Support Center (HOSC) providing critical engineering support analysis and data systems capability for the Redstone, Atlas, and Saturn launch vehicles. This role continued for the Space Shuttle and planning has begun for the Space Launch System (SLS) Engineering Support Center (SESC). MOL has the design, implementation, and operations experience to meet the ground based data system and facility needs of any launch vehicle or other space hardware project requiring engineering support services during flight.

The HOSC operates today as the backbone of ISS Payload Operations, providing critical mission data systems for planning and command and control operations for the 100+ scientific instruments and experiments on orbit. Users may tailor their development and operations support from a broad range of services ranging from distributed command and data capability to development of flight operations products such as crew procedures. From operability analysis to operations planning, training, and mission execution, MOL's capabilities ensure mission success for ISS bound payloads, satellite missions, and other space hardware.

Space system supportability and maintenance planning are key areas where MOL offers extensive experience in design influence leading to lower operational and life cycle costs. As much as 70% of a system's operations costs are locked in by the time of the Preliminary Design Review and early assessment of the supportability and maintenance features that drive costs can significantly improve cost performance as well as reduce service time and logistics footprint of new projects.

Space hardware is often complex in nature and can require special handling and care during testing and launch system integration. MOL has the experienced personnel to conceptualize the critical Ground Support Equipment (GSE) required for space hardware systems and lead the Systems Engineering efforts leading to cost effective GSE solutions.

# Capabilities



## Advanced Operations Concepts

- > End-to-end advanced concepts development
- > Flight systems design for operability
- > Design reference mission integration
- > Mission operations plan development
- > Ground support equipment systems engineering
- > Supportability engineering and logistics concepts



## Planning

- > Planning and execution template and process management
- > Design reference mission analysis
- > Operations sequences and timeline developments
- > Mission requirement assessment and integration
- > Supply chain and resource management
- > Operations guideline and constraint development



## Training

- > Training template and process management
- > Crew and ground personnel training conduct
- > Flight procedures and display development
- > Modeling and Simulation
- > Virtual training and 3D prototyping
- > Vehicle and payload design team training assessments



## Huntsville Operations Support Center (HOSC)

- > Ground data systems for real time Command and Control
- > Hazardous commanding certification
- > Level III secure facility
- > Flexible remote access—deployed world wide
- > Full life cycle project support, test phase to ops phase



## Operations

- > On-orbit flight system command and control
- > Mission requirements assessment and integration
- > Commercial, science, and DOD payload operations
- > Operations resources planning and management
- > Operations sequence and timeline development
- > Operations guideline and constraint development
- > Crew Interface Operability
- > Flight operations team staffing
- > Flight operations product development
- > Mission execution
- > Ground based and on-orbit logistics support



## Advanced Data Systems

- > Innovations to reduce cost, increase ops capabilities
- > Interoperable Command & Control system of systems architectures
- > Seamless integration of planning, scheduling, and real-time capabilities
- > Expandable data reduction and storage
- > Teleoperations & Telescience R&D
- > Early engineering support for space systems development and test

For more information, please visit [www.nasa.gov/centers/marshall/about/business.html](http://www.nasa.gov/centers/marshall/about/business.html)

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